of defence—boxing and wrestling. What are called balance movements in the Swedish system, as well as abdominal movements, are included in a truly "utilitarian" manner in climbing exercises. So far as abdominal movements are concerned, this does not allow graduation of resistance, which is a matter of importance. There is little variety of limb exercises, and the group of back exercises, so valuable for their corrective effect in regard to the faulty positions assumed in most occupations, are entirely omitted. Head and neck exercises are also omitted, while lateral trunk movements are only used as applied movements, and are therefore not graduated.

The more definite grouping of movements in the Swedish system allows of a more graduated and equal training for each part of the muscular system, each group of muscles, and, therefore, of the body as a whole. Free trunk movements, lateral and otherwise, are obviously of value in acquiring strength, flexibility, and complete coordination. Free arm movements are of greater value for the normal development of the arms and chest than movements of lifting and throwing.

In a Swedish gymnastic lesson the hardest work is performed in the middle of the lesson, the amount of exertion being graduated throughout. M. Hébert also graduates the amount of work, but leaves the hardest work to be performed towards the end of the lesson. The effect of the former method on circulation and respiration, and on the distribution of blood in the body, is more desirable physiologically.

M. Hébert lays due stress on the importance of deep breathing, and of complete expiration as well as inspiration. On the other hand, he recommends as an exercise slow marching, breathing in during four to six steps, breathing out during four to six steps, either with or without an intermediate respiratory pause with expanded chest for one or two steps. This method of breathing would undoubtedly tend to produce over-expansion of the chest, with loss of elasticity and accompanying emphysema. Marching with the hands crossed behind the back (Fig. 18) also tends to fix the chest and hinder complete expiration, besides producing a bad position of the shoulders and often hollow back. Sun and air baths and gymnastics in the open air are recommended, the body being uncovered except for a short pair of drawers, unless the weather is specially inclement, or the sun very hot, when a protective covering for the head and back of the neck is added.

The illustrations as a whole are excellent, although some of those which illustrate jumping appear to show that the height of the jump is considered more than the correctness of the attitude in jumping (Fig. 94).

The book is arranged clearly, and is much more readable than the more severe and "complete" gymnastic treatises. Mina L. Dobbie.

OUR BOOKSHELF.

L'Aviation. By Prof. P. Painleve, Prof. E. Borel, and Ch. Maurain. Sixième edition. Pp. viii + 298. (Paris: Librairie Felix Alcan, 1913.) Price 3 francs 50 centimes.

Written by well-known members of the French aeronautical professions, the book provides a simple and interesting account of the position of aviation at the present time. The text rarely deals quantitatively with the problems connected with the construction or motion of an aeroplane, calculations being left to notes at the end of the book; the notes occupy about one-third of the whole, and refer to investigations many of which are the original work of the authors.

Only a very short historical portion is provided as introduction, but it is interesting to find that the work of Sir George Cayley, as a pioneer in the development of the theory of the aeroplane, is prominently referred to. The "coming of the aeroplane" is dated from the autumn of 1908, when the flights of Farman, Delagrange, Blériot, and the striking achievements of the Wright Brothers began to attract attention; the subsequent rapid development of aviation and its causes are referred to and illustrated by means of a record of the best results obtained at successive stages.

A discussion of the flight of birds in winds, on the lines of Langley's "Internal work of the Wind," is used to illustrate the possibility of extracting energy from the wind, and so flying without the use of an engine.

Aeroplanes of various types, made in the period 1908–10, are illustrated, and the organs described in some detail. The use of the elevator and rudder in manœuvring is referred to under gliders, but stability, longitudinal and lateral, is referred to power-driven machines. Lateral stability is subdivided into "stability of gyration," that is, stability of direction relative to the wind and "lateral stability" in the limited sense of keeping an even keel. Bryan has shown that the subdivision may be misleading as the two are not independent, and should be treated together.

The book has the advantage of a very complete index, which makes reference a simple matter.

Household Bacteriology: For Students in Domestic Science. By Estelle D. Buchanan and Prof. R. E. Buchanan. Pp. xv + 536. (New York: The Macmillan Company; London: Macmillan and Co., Ltd., 1913.) Price 10*s.* net.

"Domestic science" is rightly coming to the fore, and in any course of instruction devoted to this subject, some amount of bacteriology, or "microbiology," as it may preferably be termed, must be included. The present volume practically covers the ground of such knowledge of micro-

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organisms as is desirable for the domestic science student. It is divided into five sections, dealing respectively with (*a*) morphology and classification; (*b*) cultivation and methods of investigation; (*c*) physiology; (*d*) fermentation; and (*e*) micro-organisms in relation to health and disease. The bacteria, yeasts, and moulds are considered at some length, and a chapter on parasitic Protozoa is included.

The chapters on general morphology and classification are particularly good, and a clear account is furnished of the distinguishing features of the various groups. In an appendix an illustrated key is given of the families and genera of the common moulds; this will be found most useful in the laboratory by other than domestic science students.

The brief description of the optics of the immersion system of lenses is correct, so far as it goes, but a paragraph should have been inserted pointing out that the great advantage of this system is the increased resoluion obtained thereby.

The chapter on food preservation is a useful summary of the subject, but might have been extended with advantage.

The chapters on the nitrogen cycle in nature, alcoholic and other fermentations, enzyme action, and the ripening of certain foods are all satisfactory and convey a considerable amount of coordinated information on these important aspects of microbiology.

Much space (140 pages) is devoted to a consideration of disease and disease-producing micro-organisms, vegetable and protozoal. We think this section could have been somewhat curtailed with advantage, having regard to the avowed limitation of the book; and the space so gained might then have been devoted to a fuller consideration of certain aspects of household microbiology. Such criticisms as have been offered are those of detail, but the book as a whole is an excellent one. It is profusely and well illustrated, and can be strongly recommended not only to the domestic science student, but to a wider public.

R. T. HEWLETT.

Aus Süd-Brasilien. Erinnerungen und Aufzeichnungen. By Dr. W. Breitenbach. Pp xvi+251. (Brackwede i. W.: Dr. W. Breitenbach, 1913.) Price 3 marks.

THE author has lived in southern Brazil for several years in order to observe the land and the people, especially the German colonies, and beginning in the year 1884, he has since described his observations in more than thirty newspaper articles, essays, and separate pamphlets. Considering the changes which have come about in Brazil within the last thirty years, this book does not pretend to deal with present-day questions of commerce, industry, and general development, or with the colonisation scheme, which, of course, has undergone complete modifications. His personal experiences, narratives of various journeys, are also omitted, having been described elsewhere. It is, therefore, not very obvious why these "reminiscences and notes" should be published now.

The fragmentary chapters on minerals, fauna, and flora are poor. Others, written in the easy, fluent style of feuilletons or causeries, deal with the life in towns, chiefly Porto Alegre, the capital of South Brazilian Germans, whose customs, modes of assimilation, ideals, and successes are compared with those of the Brazilians.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents. Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

Branch Product in Actinium C.

IT is now well established that the atoms of radium C and thorium C can break up in two distinct ways, *i.e.*, with the expulsion of either an α or a β particle. It is to be expected from the close analogy between the C products of the various radio-active families that actinium C should also show abnormal disintegration, and, further, it might be anticipated that one of the branch products would emit an α particle with great velocity and corresponding long range. We have made experiments to test this point. A source of actinium active deposit was covered with a sheet of mica equivalent to about 5 cm. air in stopping power of α particles, and the whole placed in an exhausted chamber with a zinc sulphide screen about 2 cm. from the source. The numbers of scintillations appearing on the screen per minute for different pressures of the air inside the apparatus were counted, and thus the falling off of the α particles with "range" determined. The results showed that in addition to the α particles of actinium C with range 5·4 cm., a small number, about 1 in 600, can penetrate as far as about 6·45 cm. Special experiments showed that the long-range α particles could not be due to radium or thorium impurity, and they must therefore be attributed to the expected new branch product.

In connection with this question, it should be noticed that Mme. Blanquies, in 1910, inferred the existence of two α-ray products in the active deposit of actinium from the shape of the Bragg ionisation curve. The small fraction of long-range α particles found in our experiments, viz., 1 in 600, is, however, quite insufficient to be reconciled with her results. We are therefore repeating her experiments.

E. MARSDEN.
R. H. WILSON.

University of Manchester, September 3.

The Terrestrial Distribution of the Radio-elements and the Origin of the Earth.

IN NATURE of June 19 and August 7, 1913, Mr. Holmes, in two interesting letters, shows on the basis of the planetesimal hypothesis how a concentration of the radio-elements might possibly take place in the earth's crust with their absence at depth to satisfactorily account for the observed temperature gradient of the earth; and in his latest communication he indicates how the inhibition of radio-activity by pressure might bring about the same result. But the terrestrial distribution of these elements seems to be of further importance in that it may enable us to determine whether our earth had a stellar or a planetesimal origin.

On the stellar hypothesis, the earth would be partly developed by a process of oxidation—practically the same as that by which we manufacture steel from

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